

## CLAIMS

1. A three dimensional object creation system that prints objects layer by layer, the system including a plurality of printheads, the system printing at least part of each of multiple layers simultaneously,  
 wherein each layer is defined by a plurality of voxels arranged in a regular array and wherein the  
 5 voxels of each layer are printed so as to be offset by half a voxel relative to the voxels of adjacent layers in a first direction, a second direction perpendicular to the first direction or both the first and second directions.
2. The system of claim 1 wherein the voxels are printed in a hexagonal close-pack configuration.
3. The system of claim 1 wherein the voxels are printed in a face centered cubic configuration.
- 10 4. The system of claim 1 wherein the printheads are fixed inkjet printheads that simultaneously print the full width of the products.
5. The system of claim 1 wherein multiple layers of the same material are printed.
6. The system of claim 1 wherein more than 100 layers are printed simultaneously.
7. A system as claimed in claim 1 wherein the system includes a plurality of printheads.
- 15 8. A system as claimed in claim 1 wherein the printheads are configured to enable printing of at least two different materials in at least one layer.
9. A system as claimed in claim 1 wherein the printheads are configured such that at least one of the layers may be printed with a first set of materials and at least one other of the layers may be printed with a second set of materials, and  
 20 wherein the first and second sets are not the same.
10. A system as claimed in claim 1 wherein the system is configured to enable at least one first printhead that is initially configured to print at least part of a first layer to be dynamically reconfigured to print at least part of a second layer.
11. A system as claimed in claim 1 wherein the system is configured to enable at least one first printhead  
 25 that is initially configured to print at least part of a first layer to be dynamically reconfigured to print at least

part of a second layer, and

wherein if at least one printhead initially configured to print the second layer fails whilst printing said second layer, said at least one first printhead is dynamically reconfigured to complete the printing of at least part of said second layer.

5 12. A system as claimed in claim 1 wherein the system includes semiconductor memory and wherein data defining at least one layer is stored in the semiconductor memory.

13. A system as claimed in claim 1 which executes a process, the system including a plurality of subsystems, each of which performs a stage of the process,

10 each of the subsystems configured to perform one of a first subset of  $N_1$  of the stages, where  $N$  is greater than 1 and to change the stage of the subset being performed on receipt of a change instruction;

wherein, in the event that one of the subsystems fails, at least one of the remaining subsystems synchronously changes to performing the respective stage of the failed subsystem without requiring transfer of data relating the respective stage to the said at least one remaining subsystems, and

15 when a subsystem changes to performing a different stage, the system reconfigures the subsystem to be capable of performing a second subset  $N_2$  of the stages where  $N_1$  and  $N_2$  have the same number of stages.

14. A system as claimed in claim 1 including a least two printheads, wherein a first printhead is actively maintained at a first temperature and a second printhead is actively maintained at a second temperature.

20 15. A system as claimed in claim 1 including a least two printheads, a first one of the printheads printing a first material and a second one of the printheads printing a second material, the first material being cured by a first method and the second material being cured by a second method and wherein the first and second methods are different.

25 16. A system as claimed in claim 1 including at least one printhead for printing material to create a printed product; and

an object incorporation device that incorporates inorganic semiconductors into the product being printed whilst the at least one printhead prints the product.

17. A system as claimed in claim 1 including at least one object incorporation device that incorporates non-printed objects into partially completed product, the non-printed objects not being printed by the system.

5 18. A system as claimed in claim 1 including an object incorporation device that inserts at least one non-printed object into at least one cavity created during the printing process, the object incorporation device incorporating the at least one non-printed object into the at least one cavity during the printing of the respective printed object.

19. A system as claimed in claim 1 including at least one printhead that prints electrical connections to at  
10 least one object incorporated in the products.